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Burke et al.

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(54) **MULTISENSORY SPEECH DETECTION**

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(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,657,422 A 8/1997 Janiszewski et al.
5,867,386 A 2/1999 Hoffberg et al.

(Continued)

FOREIGN PATENT DOCUMENTS

EP 1063837 A2 12/2000
EP 1662481 A2 5/2006

(Continued)

OTHER PUBLICATIONS

Korean Office Action for the related Application No. 10-2019-7007047 dated Jun. 8, 2019.

(Continued)

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(57) **ABSTRACT**

A computer-implemented method of multisensory speech detection is disclosed. The method comprises determining an orientation of a mobile device and determining an operating mode of the mobile device based on the orientation of the mobile device. The method further includes identifying speech detection parameters that specify when speech detection begins or ends based on the determined operating mode and detecting speech from a user of the mobile device based on the speech detection parameters.

20 Claims, 19 Drawing Sheets

